

**ANTERIOR STABILIZED KNEE IMPLANT****CROSS-REFERENCE TO RELATED APPLICATION**

This is a divisional application of U.S. patent application Ser. No. 12/437,000, which issued as U.S. Pat. No. 8,915,965, entitled "Anterior Stabilized Knee Implant", which is incorporated by reference herein in its entirety.

**RELATED ART****1. Field of the Invention**

The present disclosure relates to orthopaedic knee prosthetics and, more specifically, to anterior stabilized orthopaedic knee prosthetics for use with posterior cruciate retaining total knee arthroplasty procedures.

**2. Background**

The knee is the largest joint in the body. Normal knee function is required to perform most everyday activities. The knee is made up of the lower end of the femur, which rotates on the upper end of the tibia, and the patella, which slides in a groove on the end of the femur. Large ligaments attach to the femur and tibia to provide stability. The long thigh muscles give the knee strength.

The joint surfaces where these three bones touch are covered with articular cartilage, a smooth substance that cushions the bones and enables them to move easily. The condition of this cartilage lining the knee joint is a key aspect of normal knee function and is important to the physician when evaluating a potential need for a knee joint replacement.

All remaining surfaces of the knee are covered by a thin, smooth tissue liner called the synovial membrane. This membrane releases a special fluid that lubricates the knee, reducing friction to nearly zero in a healthy knee.

Normally, all of these components work in harmony. But disease or injury can disrupt this harmony, resulting in pain, muscle weakness, and reduced function.

In addition to the smooth cartilage lining on the joint surfaces, there are two smooth discs of cartilage that cushion the space between the bone ends. The inner disc is called the medial meniscus, while the disc on the outer side of the knee joint is called the lateral meniscus. The role of the menisci is to increase the conformity of the joint between the femur and the tibia. The menisci also play an important function as joint shock absorbers by distributing weight-bearing forces, and in reducing friction between the joint segments.

There are also four major ligaments that play an important part in stability of the knee joint. The Medial Collateral Ligament (MCL) and the Lateral Collateral Ligament (LCL) are located on opposing sides on the outside of the joint. The Anterior Cruciate Ligament (ACL) and the Posterior Cruciate Ligament (PCL) are more centrally located ligaments within the joint. The ACL attaches to the knee end of the Femur, at the back of the joint and passes down through the knee joint to the front of the flat upper surface of the Tibia. It passes across the knee joint in a diagonal direction and with the PCL passing in the opposite direction, forms a cross shape, hence the name cruciate ligaments.

Total knee replacement (TKR), also referred to as total knee arthroplasty (TKA), is a surgical procedure where worn, diseased, or damaged surfaces of a knee joint are removed and replaced with artificial surfaces. Materials used for resurfacing of the joint are not only strong and durable but also optimal for joint function as they produce as little friction as possible.

The "artificial joint or prosthesis" generally has three components: (1) a distal femoral component usually made of a biocompatible material such as metal alloys of cobalt-chrome or titanium; (2) a proximal tibial component also made of cobalt chrome or titanium alloy; and a bearing component disposed there between usually formed of a plastic material like polyethylene.

In total knee arthroplasty (TKA) there are three main types of implants: The first main type is the posterior cruciate retaining (PCR) total knee arthroplasty, where the surgeon retains the posterior cruciate ligament and sacrifices the anterior cruciate ligament. The second main type is the posterior stabilizing (PS) total knee arthroplasty, where the surgeon sacrifices both the anterior cruciate ligament (ACL) and the posterior cruciate ligament (PCL). With a PS TKA posterior stabilization is introduced into the TKA by using a cam/post mechanism. The third main type is the posterior cruciate sacrificing (PCS) TKA where the surgeon sacrifices both the ACL and the PCL, but does not use a cam/post mechanism for posterior stabilization. Rather, this TKA type uses constraint in the polyethylene to stabilize the anteroposterior movement.

Any of the above three main types of TKA implant can have a fixed bearing (FB) design or a mobile bearing (MB) design. With the fixed bearing design, the polyethylene insert is either compression molded or fixed in the tibial tray using a locking mechanism. In a mobile bearing design, the polyethylene insert is free to either rotate, translate or both rotate and translate.

While knee arthroplasty is known as one of the most consistently successful surgeries offered, there is room for improvement. For example, the ACL is sacrificed during the installation of a total knee arthroplasty system, and doing so can have a negative clinical impact for some patients.

The role of the ACL is to pull the femur in the anterior direction at terminal extension and at full extension. The ACL, attached to the lateral condyle of the femur also works as a tether and keeps the lateral condyle in contact with the lateral meniscus. The PCL pulls the femur in the posterior direction with increasing flexion. The PCL also acts as a tether on the medial condyle of the femur, keeping the medial condyle in contact with the medial meniscus. Together these two ligaments are vitally important to the stability of the knee joint, especially in contact sports and those that involve fast changes in direction and twisting and pivoting movements. Therefore a torn or absent ACL has serious implications for the stability and function for the knee joint. In other orthopaedic fields, surgeons usually recommend ACL replacement surgery for a torn ACL because without the ACL, the femorotibial joint becomes unstable. It is assumed that this instability leads to meniscus and cartilage damage. Unfortunately, the ACL is sacrificed in TKA.

Known TKA implants provide for posterior stabilization, but not anterior stabilization. What is needed, therefore, is a TKA implant that provides for anterior stabilization in the absence of a surgically removed ACL while also accommodating a retained PCL.

**INTRODUCTION TO THE INVENTION**

Currently, most TKA patients do not receive an implant that replaces the functionality of an absent ACL. Specifically, prior art implants do not resist anterior thrust of the femur relative to the tibia, and such resistance is needed to achieve optimal knee joint functionality.

Referring to FIG. 1, a normal knee joint includes the ACL and PCL. For a normal joint, the ACL is operative to pull the